

## WHAT IS CLAIMED IS:

1. A method for controlling the level of a drum in a drum-type boiler comprising:

adjusting a gain of a drum level PID in accordance with a signal representative of a set of tuning constants, a signal representative of drum level, and a signal representative of a drum level setpoint;

utilizing a flow control PID to adjust a drum level control valve, wherein said flow control PID adjusts the drum level control valve in accordance with an output of the drum level PID, a signal representative of steam flow, and a signal representative of drum feedwater flow.

2. A method in accordance with Claim 1 further comprising maintaining a constant differential pressure across the drum level control valve.

3. A method in accordance with Claim 1 wherein said tuning constants comprise a minimum proportional gain  $K_{pMIN}$ , a maximum proportional gain  $K_{pMAX}$ , a minimum drum level error  $Error_{LO}$ , and a maximum drum level error  $Error_{HI}$ .

4. A method in accordance with Claim 3 further comprising adding a signal representative of steam flow to an output of the drum level control PID to produce a summed signal and using the summed signal as a setpoint for the flow control PID.

5. A method in accordance with Claim 4 further comprising maintaining a constant differential pressure across the drum level control valve.

6. A method in accordance with Claim 3 further comprising adjusting the gain of the drum level PID so that:

when an absolute error of the level of the drum from a setpoint is less than  $Error_{LO}$ , the flow control PID is predominant over the drum level PID;

when an absolute error of the level of the drum from the setpoint is greater than ErrorHI, the drum level PID is predominant over the flow control PID; and

at an operating point when the absolute error of the level of the drum from the setpoint is between ErrorLO and ErrorHI, the flow control PID and the drum level PID are of equal dominance.

7. A method in accordance with Claim 6 further comprising updating the gain of the drum level control PID at least every 0.5s.

8. A method in accordance with Claim 7 further comprising maintaining a constant differential pressure across the drum level control valve.

9. A method in accordance with Claim 1 further comprising updating the gain of the drum level control PID at least every 0.5s.

10. A control apparatus for controlling the level of a drum in a drum-type boiler, said apparatus configured to:

adjust a gain of a drum level PID in accordance with a signal representative of a set of tuning constants, a signal representative of drum level, and a signal representative of a drum level setpoint; and

utilize a flow control PID to adjust a drum level control valve, wherein said flow control PID adjusts the drum level control valve in accordance with an output of the drum level PID, a signal representative of steam flow, and a signal representative of drum feedwater flow.

11. An apparatus in accordance with Claim 10 further configured to maintain a constant differential pressure across the drum level control valve.

12. An apparatus in accordance with Claim 10 wherein said tuning constants comprise a minimum proportional gain  $K_{pMIN}$ , a maximum proportional

gain  $K_{pMAX}$ , a minimum drum level error  $Error_{LO}$ , and a maximum drum level error  $Error_{HI}$ .

13. An apparatus in accordance with Claim 12 further configured to add a signal representative of steam flow to an output of the drum level control PID to produce a summed signal and to use the summed signal as a setpoint for the flow control PID.

14. An apparatus in accordance with Claim 13 further configured to maintain a constant differential pressure across the drum level control valve.

15. An apparatus in accordance with Claim 14 further configured to adjust the gain of the drum level PID so that:

when an absolute error of the level of the drum from a setpoint is less than  $Error_{LO}$ , the flow control PID is predominant over the drum level PID;

when an absolute error of the level of the drum from the setpoint is greater than  $Error_{HI}$ , the drum level PID is predominant over the flow control PID;  
and

at an operating point when the absolute error of the level of the drum from the setpoint is between  $Error_{LO}$  and  $Error_{HI}$ , the flow control PID and the drum level PID are of equal dominance.

16. An apparatus in accordance with Claim 15 further configured to update the gain of the drum level control PID at least every 0.5s.

17. An apparatus in accordance with Claim 16 further configured to maintain a constant differential pressure across the drum level control valve.

18. An apparatus in accordance with Claim 10 further configured to update the gain of the drum level control PID at least every 0.5s.